REMARKS

Claims 1 through 10, and 14 through 23 are in this application and are presented for consideration. Claims 1, 2 and 7 have been amended and new claims 14 through 23 have been added.

The specification, drawings and claims have been amended to address the Examiner's objections, incorporate the Examiner's suggestions and to place the application in better form. The claims have also been amended to further highlight and more clearly point out the important features of the invention. Applicant thanks the Examiner for the careful reading of this application, for pointing out discrepancies, and for providing suggestions.

The independent claims have been rejected as being obvious over Pineau '147 in view of Kasai '159.

New independent claim 14 sets forth a method where a single audio signal is received. The specification and drawings have been amended to give the generator/source of the single audio signal the reference 1. Claim 14 then sets forth the step of splitting this single audio signal into a first leg and a second leg. The drawings have been amended to indicate the legs by reference numerals 2 and 3. The specification has been amended to correspond to the change in the drawings. Applicant has reviewed the prior art, and finds no teaching nor suggestion of receiving a single audio signal and splitting that signal into a first and second leg, especially in combination with the other features of claim 14.

The rejection uses Pineau, in particular figure 4, to show a single source. Applicant has reviewed figure 4, and notes that figure 4 does not show receiving a single audio signal and

splitting that audio signal into first and second legs. Applicant has further reviewed Pineau, and notes that Pineau specifically requires right and left complementary sonic information, column 6 lines 52 through 64. Therefore Pineau requires two different audio signals, in particular a left channel or output, and a right channel or output. Each channel or output in Pineau is recorded separately, amplified and fed to its respective left or right speaker. Pineau requires these separate audio signals in order to reproduce stereophonic sound. Therefore figure 4, and the entire goal of Pineau, does not anticipate the splitting of an audio signal into first and second legs. New independent claim 14 therefore defines over the rejection.

Furthermore, it would not be obvious to modify Pineau to split a single audio signal into two legs, as in the present claims, because this would not produce a stereophonic effect. Such a modification would change the principle of operation of Pineau, and such a modification is not an indication of obviousness as per the MPEP. Therefore new claim 14 further defines over any obvious modifications to Pineau.

Claim 14 also sets forth varying an amplitude and phase of the audio signal in the first leg with respect to the second leg. In the embodiment of the present drawings, the varying of the amplitude and phase is done via the amplification circuits and delay circuits 11, 12, 13 and 14. Applicant has reviewed Kasai, and finds no teaching nor suggestion of splitting a single audio signal into two separate legs, and then varying an amplitude and phase of the signal in one leg with respect to the other like. The rejection uses figure 8 of Kasai to teach two speakers being powered as separate elements. Applicant has reviewed Kasai, and notes that while Kasai does describe amplifiers 103 and 104 powering speakers 107 and 106 respectively, there is no

indication that a phase in a signal applied to one speaker is varied with respect to a phase of the signal in the other speaker. Therefore figure 8 of Kasai does not anticipate the step of receiving a single audio signal, splitting that signal into different legs, and then varying the amplitude and phase of the signal in one leg with respect to the other leg. Therefore claim 14 defines over the combination of Pineau and Kasai.

Claim 14 also sets forth that the varying is done to selectively control the spatial dispersion of the sound emitted by the first and second speakers. One of the main goals of the present invention is to provide a speaker which is highly directional. Very often speakers are desired which produce sound in one direction only. Applicant notes that this is very difficult to do with speakers that reproduce low frequencies. Low frequencies are well known to be omnidirectional, especially in the practical environments in which people live. As an example, speaker placement for high frequencies, such as tweeters and midrange speakers is highly important in a room. Many audio systems require specific placement of such speakers, usually in the four corners of a room. The position of a subwoofer in such a system, on the other hand is unimportant. Speaker systems such as "surround sound" often require speakers in each corner and one in the front center. However the subwoofer can be placed anywhere, such as under a table, or behind a chair or couch. It is quite clear then that low frequencies are inherently omnidirectional in normal listening environments.

The present invention provides a method for reproducing sound where the direction in which the low frequency sound is emitted, or the spatial dispersion, can be controlled. In particular, the present invention provides a method where the sound is emitted strongly in a first

direction, and is emitted weakly, if at all, in a second direction which is opposite to the first direction. Basically, the present invention wants the sound to come out of the front of an enclosure, but not to have that sound wraparound and disperse to the area in back of the enclosure, as would normally occur, especially with low frequencies. The present invention achieves this goal by, surprisingly, placing a speaker in the enclosure and facing the speaker in the opposite/second direction, where sound is not desired. This may appear to be counterintuitive, since the present invention is actually generating a sound in the second direction, while trying to keep the sound from the first direction from wrapping around into the second direction.

Applicant has found that spatial control is possible by varying the amplitude and phase of the signal that drives the speaker facing in the opposite/second direction. In particular, the varying of the amplitude and phase is performed to cause interference, present specification page 7 lines 3 through 5, between the sound from the front speaker and the sound from the rear speaker. By varying the amplitude and phase, of one speaker with respect to the other speaker, the amount of sound heard at various positions around the enclosure changes. By varying the amplitude and phase, sound from the rear facing speaker can be made to cancel the sound from the front speaker that wraps around to the rear. This is particularly shown in figures 5 and 6 of the present application.

In figures 5 and 6, the outermost circle shows a ratio of 5 dB. The center of the graph shows a ratio of -20 dB. As one can see, when one is in front of the enclosure, at the 0° position, the ratio is 0 dB or 1:1. As one's position moves around the enclosure towards the

back, the amount of sound drops off, reaching its minimum at the 180 ° position. In figure 5, the sound at the 180° position is down mostly between -10 and -15 dB. Furthermore, other variations in amplitude and phase of the signal in one leg with respect to the other leg can cause the spatial dispersions as shown in figure 6.

Applicant finds no teaching nor suggestion in the applied prior art of varying an amplitude and phase of a split signal in order to control spatial dispersion of sound from two speakers. Therefore the step in claim 14 of selectively varying amplitude and phase to control spatial dispersion causes claim 14 to further define over the applied prior art.

New independent claim 18 sets forth a first and second leg connected in parallel to a single audio source and receiving a single audio signal. A circuit is arranged in one of said legs to selectively vary an amplitude and phase of the audio signal in one leg with respect to the other leg in order to control the spatial dispersion of the sound. As described above, with respect to claim 14, the prior art does not show two legs connected in parallel to a single audio source and receiving a single audio signal, especially where one of those legs has circuitry to vary an aptitude and phase in one leg with respect to the other leg to control the spatial dispersion of sound. Therefore claim 18 also defines over the prior art.

Independent claims 1 and 7 have been amended to set forth that the pair of loudspeakers receive a single signal from a single source, and that an amplitude and phase of the single signal is varied in one of loudspeakers. As described above, Pineau does not show two loudspeakers receiving a single signal. Kasai does not show varying amplitude and phase of a split signal with respect to another split signal. Amended independent claims 1 and 7, therefore also define over

the applied prior art.

Additional claims have been added to set forth further features of the invention which are also not taught nor suggested in the references. These features are self evident from the claims themselves and it is applicant's position that these claims therefore further define over the references.

If the Examiner has any comments or suggestions which would further favorable prosecution of this application, the Examiner is invited to contact applicant's representative by telephone to discuss possible changes.

At this time applicant respectfully requests reconsideration of this application, and based on the above amendments and remarks, respectfully solicits allowance of this application.

Respectfully submitted
for Applicant,

By:_____
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TD:tf
71635-5
Attached: (1) Replacement Sheet of Drawings
Petition for Three Month Extension of Time

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